

Math 400: Discussion/ Review Questions # 4

A statement listed with [T/F] is a True/False statement that requires a proof or a counterexample, as appropriate.

1. [T/F] Every monotone sequence is convergent.
2. [T/F] Every convergent sequence is monotone.
3. [T/F] If a sequence is monotone and bounded, then it is convergent.
4. [T/F] If (a_n) is a sequence of positive real numbers, then the sequence of partial sums of the series $\sum_{n=1}^{\infty} a_n$ forms a bounded sequence.
5. [T/F] If (a_n) is a sequence of positive real numbers, then the sequence of partial sums of the series $\sum_{n=1}^{\infty} a_n$ forms a monotone sequence.
6. [T/F] The following series converges: $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$.
7. [T/F] If (a_n) converges to 0 then $\sum_{n=1}^{\infty} a_n$ converges.
8. [T/F] If $\sum_{n=1}^{\infty} a_n$ converges then (a_n) converges to 0.
9. [T/F] A subsequence of $(1, 1, 2, 3, 5, 6, 13, 21, 34, \dots)$ is $(1, 2, 5, 13, 34, \dots)$.
10. [T/F] A subsequence of $(1, 1, 2, 3, 5, 6, 13, 21, 34, \dots)$ is $(1, 2, 1, 5, 3, 13, 34, \dots)$.
11. [T/F] A subsequence of $(1, 1, 2, 3, 5, 6, 13, 21, 34, \dots)$ is $(1, 1, 2, 2, 5, 5, 13, 13, 34, 34, \dots)$.
12. [T/F] A subsequence of $(1, 1, 2, 3, 5, 6, 13, 21, 34, \dots)$ is $(1, 1, 2, 3, 5, 6, 13, 21, 34, \dots)$.
13. [T/F] If (a_n) converges to a , then every subsequence of (a_n) converges to a .
14. [T/F] If some subsequence of (a_n) converges to a , then (a_n) converges to a .
15. [T/F] If every subsequence of (a_n) converges to a , then (a_n) converges to a .
16. [T/F] Every sequence of real numbers contains a convergent subsequence.
17. [T/F] Every monotone sequence of real numbers contains a convergent subsequence.
18. [T/F] Every bounded sequence of real numbers contains a convergent subsequence.